

# CASE STUDY

# The Boeing Company

## Sensor Tracking Software Improves Production Processes, Saving Millions

### CHALLENGE

- Multiple hardware vendors, multiple tag types with multiple systems.
- Unable to find assets and supplies in the production process.
- Limited visibility across the enterprise.

### APPROACH

- Develop an enterprise solution to transform near real-time data into actionable information for Boeing factories.
- Build an enterprise class middleware solution connecting all different tag types into one user interface.
- Create mapping capabilities to provide universal enterprise-wide visibility.
- Integrate Passive RFID, Wi-Fi, GPS enabled Wi-Fi and Ultraband Active RFID tags into a single system.

### RESULTS

- Tapestry completed the project on-time and on-budget.
- The solution has been rolled out and fully operational at over 50 sites.
- Tracking 2 billion tag reads per week.
- Projected savings of over \$100 million annually.
- Complete visibility of the manufacturing process regardless of tag types and hardware.

Tapestry Solutions worked with Boeing, the world's largest aerospace company, to build a solution to increase visibility across the company, with a focus on the manufacturing and assembly process.

Our experience with sensor tracking and logistics software played a key role in Boeing's decision to move forward with a solution to fit the needs of their large defense and commercial manufacturing operations.

We set out to build an automated information management system to provide a single solution with near real-time data into Boeing's factories.

The solution, called the Automated Identification Technology - Information Management System (AIT-IMS), would deliver standardization and automation across the entire enterprise.

Tapestry worked collectively with Boeing Commercial Airplanes, Defense, Space & Security, Manufacturing and Quality Systems, Research and Technology and Information Technology to review use cases and define functional requirements and features to support these cases. After the requirements were validated,

a phased approach was established with a budget, scope and schedule.

Tapestry provided transparency throughout the process from testing to bug fixes, schedule and implementation production, creating a strong relationship with the Boeing team.

Tapestry broke down the development of AIT-IMS into multiple phases that would bring the product to full operational capability while providing incremental benefits along the way.

The approach took into account the operational needs and implementation timelines for a variety of technology insertions across the company. Tapestry aligned the requirements into discrete block builds to support the operational priorities of Boeing, while maintaining flexibility to accommodate process, priority and technology adjustments.

Tapestry performed to budget and has provided 100% on schedule deliveries. The solution was rolled out to over fifty sites across Boeing, touching thousands of users daily. Along with the improved data, Boeing has reduced the amount of resource hours throughout the



INTEGRATE, AUTOMATE AND ACCELERATE

NEAR REAL-TIME DATA FOR COMPLICATED SUPPLY CHAINS

INCREASE OPERATIONAL EFFICIENCIES IN MANUFACTURING PROCESSES

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Projected savings over \$100 million annually.

production process and has estimated a savings potential over \$100 million dollars annually. The solution gives Boeing the ability to have an enterprise-wide, consolidated map-centric view of data regarding assembly schedules, quality and parts, location of assets, and temperature regulation.

AIT-IMS enabled Boeing to become hardware agnostic without having to worry about multiple systems with data in different places. One of the major benefits is that legacy investments into sensing hardware is leveraged and integrated to extend its value and ROI of the infrastructure components over its full lifecycle.

Boeing is also recognizing enhanced situational awareness and actionable decision support capabilities that drive efficiencies through triggers, events and actions which enhance and smooth production and overall accountability during the manufacturing and assembly process.

This is achieved by bringing together captured data from a variety of tag types, including passive RFID, Wi-Fi, GPS-enabled Wi-Fi and Ultra Wideband Active RFID, into one system.

With Tapestry and Boeing working together to develop the initial requirements for the solution, Tapestry was able to quickly design, develop and implement a long lasting solution that has yielded long-term operational efficiencies for Boeing.

Based on the success and savings realized by AIT-IMS, Tapestry has launched its commercial Enterprise Sensor Integration (ESI) solution.

## ABOUT OUR CUSTOM SOFTWARE

We provide mission-critical software and services for global defense, government and commercial industries. Our key solution areas include Mission Planning, Training & Simulation; Maintenance Repair & Overhaul; Enterprise Asset Management; and Logistics Operations including Deployment & Distribution, Logistics Command & Control, and Logistics Modeling & Simulation.

## ABOUT OUR COMPANY

Headquartered in San Diego, California, Tapestry Solutions has approximately 850 employees and a presence in more than 50 locations around the world. A wholly-owned, independent subsidiary of The Boeing Company, Tapestry provides premier Commercial Off-the-Shelf (COTS) and custom software products and service to customers worldwide.



ENTERPRISE  
VISUALIZATION OF  
ASSETS AND WORK  
FLOW ACROSS THE  
MANUFACTURING AND  
ASSEMBLY PROCESS.

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# ESI

Enterprise Sensor Integration

PROVIDING THE GATEWAY TO  
THE INTERNET OF THINGS

Combining multiple sensors, Tapestry ESI provides the infrastructure for the IoT across supply chain operations.

Proven to Handle  
Over 6 Billion Tag  
Reads Per Week



## Tapestry ESI

### Smart Sensor Integration Across the Enterprise

#### TAG, TRACK AND TRACE IT

Tapestry's Enterprise Sensor Integration (ESI) solution revolutionizes manufacturing and supply chain operations by intelligently connecting people, processes and data to improve visibility in the factory – and across the enterprise. ESI helps organizations control the chaos when faced with a growing number of disassociated sensor technologies that don't speak the same language.

ESI integrates a myriad of sensor technologies that track, monitor and control assets and workflow processes, providing the platform for the Internet of Things (IoT). It supports manufacturing, delivery and sustainment operations.

Unlike other IoT sensor solutions, ESI is a sensor-agnostic, cloud-based platform that can be implemented across a global enterprise. With ESI, supply chain visibility is not completely dependent on one manufacturer or sensor type. This ensures total asset visibility of equipment, tools, cargo and processes.

ESI connects sensors ranging from RFID position-information tags, passive and active GPS-enabled WiFi tags to

embedded hardware and complex servers, both legacy and next generation systems.

With ESI, decision makers can see a complete picture of asset movements and inventory, anytime at anywhere, with a click of a button. By transforming real-time data into actionable information, Tapestry ESI provides unprecedented levels of efficiency and cost savings.

#### KEY BENEFITS

- Standardization across the enterprise, enabling an IoT platform
- Substantial cost savings with improved inventory control, and reduced asset misplacement & loss
- Increased productivity with the reduction of manual inputs and decreased assembly time
- Improved operational visibility with mapping applications
- Enhanced situational awareness with real-time alerts
- Improved safety with early detection of approaching vehicles



IMPROVE OPERATIONAL VISIBILITY  
HARDWARE- AND SENSOR-AGNOSTIC  
REAL-TIME ALERTS TO MANAGEMENT

## LEVERAGING TECHNOLOGIES DEVELOPED FOR BOEING

Tapestry ESI is based on technologies developed for The Boeing Company, the world's largest aerospace company. At Boeing, the core technology is known as AIT-IMS, an acronym for Automated Identification Technology - Information Management System.

Tapestry rolled out the technology at 50 Boeing assembly plants, including the Everett Factory in Washington state – the largest building in the world by volume, covering 98.7 acres. At the Boeing plants, seven different supply systems and five types of RF tags were integrated on a common platform. Now, thousands of users can view various maps, zones and corresponding assets, kits and assemblies on a single integrated site.

The technology tracks more than 2 billion tag reads per week at the assembly plants, significantly improving efficiency during the production process.

ESI has resulted in a projected savings of over \$100 million annually at Boeing through decreased assembly time, automated asset receipt/payment, enhanced inventory management, and improved quality and safety.

As a result of the successful implementation at Boeing, Tapestry developed the commercially available ESI product line with expanded capabilities. Enhancements include a cloud-based platform and integration with temperature sensors, thermostats, pressure sensors and humidity sensors.

## MAJOR COMPONENTS

- **The Users Application** is the core of the solution, assigning user roles, permissions and group assignments based on organizational or functional hierarchy relating to business processes.

- **The Asset Application** is a powerful tool for management. It tracks assets in motion using zones, events and mapping. This provides decision makers with total visibility of assets in relation to workflow requirements.

- **The Zone Management Application** improves situational awareness on the factory/warehouse floor. Users have the ability to create georeferenced shapes as a layer on a map, creating a zone or group of zones. The zone monitors workflows of the manufacturing and assembly area to generate actions and events as both passive and active RFID tags enter or exit the zone.

- **The Event Application** delivers information on whether or not workflows are on track based on zones and events. Triggers are activated; the selected actions are executed delivering critical information via email, XML, or SMS to alert changes in plan, state, status or workflow.

- **The Mapping Application** allows users to easily zoom, pan, and quickly move between views and floors to see asset locations. It provides a graphical view for users to depict assets, tags, zones and readers on the map. Users with correct privileges are able to create new building and floor plans as needed.



## Manufacturing and Production Supply Chain Clarity

RFID INTEGRATION	MODEL
Motorola	XR400 Passive Reader, XR450 Passive Reader, FX9500 Passive Reader
Impinj	R640 X Portal with GPIO, R420 Passive Reader
Alien	9800 Passive Reader, 9900 Passive Reader
Zebra	Dart Vision Reader (DVR) Presence Detection Reader – Ultra Wide Band (UWB), Zebra Ultra Wide Band Hub
CISCO	Mobility Services Engine (MSE) integration for Wi-Fi Tag PLI and Presence data acquisition for AeroScout Wi-Fi and GPS-enabled Wi-Fi Tags

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